

We claim:

- 1 1. A method for rendering a region of a composite glyph, comprising:
 - 2 defining a composite glyph by a set of elements;
 - 3 generating a set of two-dimensional distance fields using the set of elements,
 - 4 wherein each two-dimensional distance field in the set of two-dimensional distance
 - 5 fields is partitioned into cells, each cell including a method for reconstructing the
 - 6 corresponding two-dimensional distance field within the cell, a composition of the
 - 7 set of two-dimensional distance fields representing the composite glyph; and
 - 8 rendering a region of the composite glyph using the set of two-dimensional
 - 9 distance fields, the rendering further comprising:
 - 10 identifying, for each two-dimensional distance field in the set of two-
 - 11 dimensional distance fields, a set of cells of the two-dimensional distance
 - 12 field, the set of cells associated with the region of the composite glyph;
 - 13 locating a set of pixels associated with the region;
 - 14 specifying a set of components for each pixel in the set of pixels; and
 - 15 determining an antialiased intensity for each component of each pixel
 - 16 in the set of pixels, the determining further comprising:
 - 17 determining, for each two-dimensional distance field in the set
 - 18 of two-dimensional distance fields, a corresponding distance for the
 - 19 component of the pixel from the corresponding set of cells;
 - 20 combining the corresponding distances to determine a
 - 21 combined distance; and
 - 22 mapping the combined distance to the antialiased intensity of
 - 23 the component of the pixel.

1 2. The method of claim 1 wherein a particular element in the set of elements is a
2 stroke.

1 3. The method of claim 1 wherein a particular element in the set of elements is an
2 outline.

1 4. The method of claim 1 wherein a particular element in the set of elements is a
2 radical.

1 5. The method of claim 1 wherein a particular element in the set of elements is a
2 stroked radical.

1 6. The method of claim 1 wherein a particular element in the set of elements is a
2 two-dimensional shape descriptor.

1 7. The method of claim 1 wherein a particular element in the set of elements is a
2 one-dimensional shape descriptor.

1 8. The method of claim 1 wherein a particular element in the set of elements is a
2 path.

1 9. The method of claim 1 wherein a particular element in the set of elements is a
2 distance field.

1 10. The method of claim 1 wherein a particular element in the set of elements is a
2 distance map.

1 11. The method of claim 1 wherein a particular element in the set of elements is an
2 adaptively sampled distance field.

1 12. The method of claim 1 wherein a particular element in the set of elements is a
2 procedure.

1 13. The method of claim 1 wherein a particular element in the set of elements is a
2 distance function.

1 14. The method of claim 1 wherein a particular element in the set of elements is an
2 implicit blend of a first shape descriptor and a second shape descriptor.

1 15. The method of claim 1 wherein a particular element in the set of elements is a
2 skeletal descriptor with a corresponding offset descriptor.

1 16. The method of claim 1 wherein a particular element in the set of elements is
2 drawn by a user.

1 17. The method of claim 1 wherein the defining is performed automatically by a
2 procedure.

1 18. The method of claim 1 wherein the defining is performed by a user.

1 19. The method of claim 1 wherein the defining is performed semi-automatically
2 by a procedure and a user.

- 1 20. The method of claim 1 wherein the defining further comprises:
2 determining a shape descriptor for a particular element in the set of
3 elements; and
4 determining a distance function for the shape descriptor to define the
5 particular element.
- 1 21. The method of claim 1 wherein the defining determines the set of elements
2 from a distance field of a shape descriptor for the composite glyph.
- 1 22. The method of claim 1 wherein a particular two-dimensional distance field in
2 the set of two-dimensional distance fields is an adaptively sampled distance field.
- 1 23. The method of claim 1 wherein a particular two-dimensional distance field in
2 the set of two-dimensional distance fields comprises a set of distances stored in a
3 memory.
- 1 24. The method of claim 1 wherein a particular two-dimensional distance field in
2 the set of two-dimensional distance fields is represented by a procedure.
- 1 25. The method of claim 1 wherein the combining performs a maximum of the
2 corresponding distances to determine the combined distance.
- 1 26. The method of claim 1 wherein the combining performs an arithmetic average
2 of the corresponding distances to determine the combined distance.
- 1 27. The method of claim 1 wherein the combining performs a union of the
2 corresponding distances to determine the combined distance.

1 28. The method of claim 1 wherein the combining performs an intersection of the
2 corresponding distances to determine the combined distance.

1 29. The method of claim 1 wherein the combining performs a difference of the
2 corresponding distances to determine the combined distance.

1 30. The method of claim 1 wherein the combining performs an implicit blend of
2 the corresponding distances to determine the combined distance.

1 31. The method of claim 1 wherein the combining performs an arithmetic
2 operation on the corresponding distances to determine the combined distance.

1 32. The method of claim 1 wherein the combining performs a conditional operation
2 on the corresponding distances to determine the combined distance.

1 33. The method of claim 1 wherein the combining uses a procedure to determine
2 the combined distance.

1 34. The method of claim 1 wherein the combining uses a table to determine the
2 combined distance.

1 35. A method for rendering a region of a composite glyph, comprising:
2 defining a composite glyph by a set of elements;
3 generating a set of two-dimensional distance fields using the set of elements,
4 wherein each two-dimensional distance field in the set of two-dimensional distance
5 fields is partitioned into cells, each cell including a method for reconstructing the

6 corresponding two-dimensional distance field within the cell, a composition of the
7 set of two-dimensional distance fields representing the composite glyph; and
8 rendering a region of the composite glyph using the set of two-dimensional
9 distance fields.

1 36. The method of claim 35 wherein the rendering further comprises:
2 identifying, for each two-dimensional distance field in the set of two-
3 dimensional distance fields, a set of cells of the two-dimensional distance field, the
4 set of cells associated with the region of the composite glyph;
5 locating a set of pixels associated with the region;
6 specifying a set of components for each pixel in the set of pixels; and
7 determining an antialiased intensity for each component of each pixel in the
8 set of pixels.

1 37. The method of claim 36 wherein the determining further comprises:
2 determining, for each two-dimensional distance field in the set of two-
3 dimensional distance fields, a corresponding distance for the component of the
4 pixel from the corresponding set of cells;
5 combining the corresponding distances to determine a combined distance;
6 and
7 mapping the combined distance to the antialiased intensity of the component
8 of the pixel.

1 38. The method of claim 35 wherein a particular element in the set of elements is a
2 stroke.

1 39. The method of claim 35 wherein a particular element in the set of elements is
2 an outline.

1 40. The method of claim 35 wherein a particular element in the set of elements is a
2 radical.

1 41. The method of claim 35 wherein a particular element in the set of elements is a
2 stroked radical.

1 42. The method of claim 35 wherein a particular element in the set of elements is a
2 two-dimensional shape descriptor.

1 43. The method of claim 35 wherein a particular element in the set of elements is a
2 one-dimensional shape descriptor.

1 44. The method of claim 35 wherein a particular element in the set of elements is a
2 path.

1 45. The method of claim 35 wherein a particular element in the set of elements is a
2 distance field.

1 46. The method of claim 35 wherein a particular element in the set of elements is a
2 distance map.

1 47. The method of claim 35 wherein a particular element in the set of elements is
2 an adaptively sampled distance field.

1 48. The method of claim 35 wherein a particular element in the set of elements is a
2 procedure.

1 49. The method of claim 35 wherein a particular element in the set of elements is a
2 distance function.

1 50. The method of claim 35 wherein a particular element in the set of elements is
2 an implicit blend of a first shape descriptor and a second shape descriptor.

1 51. The method of claim 35 wherein a particular element in the set of elements is a
2 skeletal descriptor with a corresponding offset descriptor.

1 52. The method of claim 35 wherein a particular element in the set of elements is
2 drawn by a user.

1 53. The method of claim 35 wherein the defining is performed automatically by a
2 procedure.

1 54. The method of claim 35 wherein the defining is performed by a user.

1 55. The method of claim 35 wherein the defining is performed semi-automatically
2 by a procedure and a user.

1 56. The method of claim 35 wherein the defining further comprises:
2 determining a shape descriptor for a particular element in the set of
3 elements; and
4 determining a distance function for the shape descriptor to define the
5 particular element.

1 57. The method of claim 35 wherein the defining determines the set of elements
2 from a distance field of a shape descriptor for the composite glyph.

1 58. The method of claim 35 wherein a particular two-dimensional distance field in
2 the set of two-dimensional distance fields is an adaptively sampled distance field.

1 59. The method of claim 35 wherein a particular two-dimensional distance field in
2 the set of two-dimensional distance fields comprises a set of distances stored in a
3 memory.

1 60. The method of claim 35 wherein a particular two-dimensional distance field in
2 the set of two-dimensional distance fields is represented by a procedure.

1 61. The method of claim 37 wherein the combining performs a maximum of the
2 corresponding distances to determine the combined distance.

1 62. The method of claim 37 wherein the combining performs an arithmetic average
2 of the corresponding distances to determine the combined distance.

1 63. The method of claim 37 wherein the combining performs a union of the
2 corresponding distances to determine the combined distance.

1 64. The method of claim 37 wherein the combining performs an intersection of the
2 corresponding distances to determine the combined distance.

1 65. The method of claim 37 wherein the combining performs a difference of the
2 corresponding distances to determine the combined distance.

1 66. The method of claim 37 wherein the combining performs an implicit blend of
2 the corresponding distances to determine the combined distance.

1 67. The method of claim 37 wherein the combining performs an arithmetic
2 operation on the corresponding distances to determine the combined distance.

1 68. The method of claim 37 wherein the combining performs a conditional
2 operation on the corresponding distances to determine the combined distance.

1 69. The method of claim 37 wherein the combining uses a procedure to determine
2 the combined distance.

1 70. The method of claim 37 wherein the combining uses a table to determine the
2 combined distance.